Claims

1. A high voltage pulse generating circuit comprising:

a DC voltage source having first and second output terminals;

a first switch having one end connected to said first output terminal of said DC voltage source;

a branch circuit including a free-wheel diode connected across the other end of said first switch and said second output terminal of the DC voltage source; and

a series circuit including an inductance and a second switch and being connected in parallel with said branch circuit;

wherein after making said first and second switches on to store inductive energy in said inductance, the energy stored in the inductance is commutated to a load connected across said second switch by turning-off said first and second switches

2. The high voltage pulse generating circuit according to claim 1, wherein said first and second switches are formed by first and second semiconductor switches, respectively.

3. The high voltage pulse generating circuit according to claim 2, wherein said first and second switches are formed by first and second semiconductor switches having turn-on and -off faculty.

4. The high voltage pulse generating circuit according to claim 3, wherein said first semiconductor switch is constituted by a semiconductor switching element having a low withstand voltage, said second semiconductor switch is constructed by a series circuit of a plurality of semiconductor switching elements having a high withstand voltage, the number of which is determined in accordance with an amplitude of an output voltage pulse to be generated, said circuit further comprises a plurality of iron cores, the number of which is equal to that of said plurality of semiconductor switching elements, a primary winding passing through said plurality of iron cores and being connected in series with said free-wheel diode and a plurality of secondary windings each passing through respective iron cores and being connected to gates and cathode terminals of respective semiconductor switching elements of said series circuit of semiconductor switching elements.

5. The high voltage pulse generating circuit according to claim 4, wherein each of a semiconductor switching elements of said series circuit of a plurality of

semiconductor switching elements constituting said second switch is formed by a static induction thyristor.

6. The high voltage pulse generating circuit according to claim 5, wherein said primary winding and secondary windings are wound on the iron cores by one turn.

7. The high voltage pulse generating circuit according to claim 5, wherein said semiconductor switch having a low withstand voltage constituting said first switch is formed by a power MOSFET.

8 The high voltage pulse generating circuit according to 1, wherein said second switch is turned-on again after turning-off the second switch to discharge the energy to the load.

9. The high voltage pulse generating circuit according to claim 8, wherein said second switch is turned-on again for a short time period after turning-off the second switch to discharge the energy to the load.

10. The high voltage pulse generating circuit according to claim 1, wherein said first and second switches are turned-off substantially simultaneously.

11. The high voltage pulse generating circuit according to claim 1, wherein said second switch is turned-off immediately after said first switch is turned-off.

12. The high voltage pulse generating circuit according to claim 1, wherein said parallel circuit of a capacitor and a resistor is connected in series with said free-wheel diode.

13. The high voltage pulse generating circuit according to claim 1, wherein a resistor is connected in parallel with said free-wheel diode.

14. The high voltage pulse generating circuit according to claim 1, wherein said load is a discharge gap provided in a plasma generating reactor.